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Protection of Crops Using Intelligence Surveillance

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ABSTRACT: Surveillance plays a major role in many fields be it at home, hospitals, schools, public places, farmlands etc. It helps us to monitor a certain area and prevent theft and also provides proof of evidence. In the case of farmlands or agricultural lands surveillance is very important to prevent unauthorized people from gaining access to the area as well as to protect the area from animals. Traditional methods of detecting animals in paddy fields and farms include the use of human eye to witness animal movements. It is not possible for human beings to monitor animal movements continuously throughout the day. Various methods aim only at surveillance which is mainly for human intruders, but the main enemies of such farmers are the animals which destroy the crops. This leads to poor yield of crops and significant financial loss to the owners of the farmland. This problem is so pronounced that sometimes the farmers decide to leave the areas barren due to such frequent animal attacks. This system helps us to keep away such wild animals from the farmlands as well as provides surveillance functionality.

KEYWORDS: Animal monitoring, protection of crops, traditional method, intelligence surveillance.

I. INTRODUCTION

Agriculture is the main source of livelihood of many people in different parts of the world. Unfortunately farmers are still reliant on traditional techniques that have evolved hundreds of years ago. Due to this the yield of crops are becoming low. Also there are a number of factors that contribute to the low yield of crops; animal intrusion is also one among them. In recent years wild animals are special challenge for the farmers throughout the world. Animals like wild boars, elephant, tiger and monkeys, cause serious damage to crops by animals running over the field and trampling over the crops. It causes the financial problem to the farmers. Farmers with large area of agricultural lands find it very tedious to irrigate their land manually. Crop damage caused by animal attacks is one of the major threats in reducing the crop yield. Due to the expansion of cultivated land into previous wildlife habitat, crop raiding is becoming one of the most conflicts antagonizing human wildlife relationships.

II. RELATED WORK

The effectiveness of the image capturing was assessed based on the infrared thermometer's capacity to senses the body temperature and triggering the process to capture the images. We used construction time-lapse cameras equipped with waterproof plastic protection. These cameras record at 1.3 Mpx with a resolution of 1208×720 using jpeg compression. Hundred images were collected for each class and validated the classification model. A classification model was tested and evaluated at the level of prediction by testing each image to our classification model. The combination of two classification models detected elephants, buffalos, and goat with an average accuracy of seventy-seven percentage. Most images were predicted as true-positive even though few of them were obtained as true-negative. To estimate the efficacy of the animal detection workflow, i.e., the combination of Yolo detection and image classification, we designed a graphical user interface that selects randomly one image and shows the bbox around the detected objects.

The system successfully understood the input and produced an appropriate scare-away mechanism. A scare-away mechanism was implemented for 10 seconds after the trigger of an appropriate scare-away mechanism was activated based on the detected animal. As per our testing, the scare away mechanism worked very well every time according to the prediction. If an animal is classified as a goat or buffalo or elephant, the appropriate scare-away mechanism is applied for about 10 seconds after classification. If the animal is detected, the dynamic speaker will emit the sound of fire sound, as well as if the goat or buffalo detects the ultrasound, and the sudden by the ultrasound speaker. The prediction result can be obtained from the Raspberry Pi to the interconnection within one second after prediction and the scare-away mechanism starts working at the next second the ultrasound emitted at 35000Hz. An

Android mobile application was developed using node.js to receive alerts from the system and let the user know about the detected animal. A single column real-time database was created with a firebase. An alert was sent to the user's mobile application as soon as an animal was detected. At the instance of the detection of animals, information is saved into the firebase's real-time database. The screenshots of the alert messages when an elephant, buffalo, and goat were detected. We found that the user received the alert in real-time and effectively as a result ofthe internet based alert system. Since the system was based on the internet, the ability to receive an alert was not affected by the distance between the system and the user.

III. PROPOSED ALGORITHM

The object is matched with predefined object of YOLO algorithm and camera will capture a picture and upload it to the server. After capturing the image of intruding animals, the image in the server will get deleted. Intelligence surveillance system detects the animal through YOLO framework algorithm and sends notification through mail. It also turns ON buzzer automatically and also farmer can control. In this proposed system animals can be found in real time using AI OPENCV. After acquisition of image it has to be pre-processed and compressed. Images are used to train the model. It is trained by performing feature extraction on the image to obtain the required pattern in the image, followed by feature fusion and dimension reduction to compress the image for reliable and real time performance.

Agriculture is the backbone of the economy but because of animal interference in agriculturallands, there will be huge loss of crops. Animals coming in to contact with humans, impact negatively in various means such as by depredation of crops, damaging grain stores, water supplies, houses and other assets, injuring . Farmers in India face serious threats from pests, natural calamities &damage by animals resulting in lower yields. Traditional methods followed by farmers are not that effective and it is not feasible to hire guards to keep an eye on crops and prevent wild animals.

IV. SIMULATION RESULTS

A camera is an optical instrument used to capture an image. The processor is a chip or a logical circuit that responds and processes the basic instructions to drive a particular computer. . The ALU and CU are the two parts of the processors. The Arithmetic Logic Unit performs all mathematical operations such as additions, multiplications, subtractions, divisions, etc and the control unit works like traffic police, it manages the command or the operation of the instructions. The processor communicates with the other components also they are input/output devices and memory/storage devices. When "captured" by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as the internet, and email as an attachment.

 In the Viola-Jones object detection framework, the Haar-like features square measure thus organized in one thing referred to as a classifier cascade to create powerful learner or classifier. The key advantage of Haar-like features over most alternative features is its calculation speed. Object detection is a technologically difficult and practically helpful computer vision issue and has seen important progress in recent years In computer vision and picture processing, detection and classification of objects are significant tasks. YOLO is trained to classify common objects such as bikes, dogs, etc., but was not specifically trained to classify farm animals. Reading and preparing our frame, we'll actually read the image and convert it from OpenCV's default BGR to RGB. The next bit is more interesting though; we convert the image to gray and smooth it out a bit by blurring the image. Converting to grey converts all RGB pixels to a value between 0 and 255 where 0 is black and 255 are white. R-CNN approach here used for the object detection uses deep models. The R-CNN is composed of four main parts such as selective search, pre-trained CNN, category prediction, and bounding box prediction. For the input images, selective search is applied to select multiple high-quality proposed regions, which are in multiple scales and different sizes and shapes.

Tensor Flow library is an open source library developed by Google, which is used to build a numerical computation for the deep machine learning model. You Only Live Once (YOLO) are a network that uses Deep Learning (DL) algorithms for object detection. YOLO performs object detection by classifying certain objects within the image and determining where they are located on it. Object detection and classification is important for video surveillance applications. Even though many solutions such as appearance-based and model-based are proposed to classify the moving objects within the satellite images using machine learning and deep learning techniques, they either have over fitting problems or low performance. Hence these challenges have to be addressed during detecting and classifying the objects.
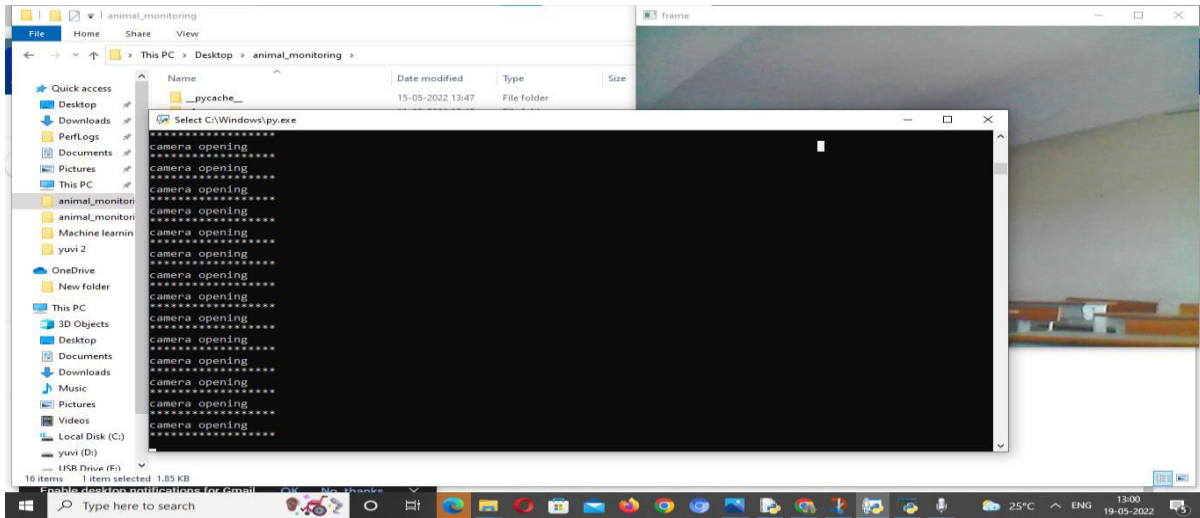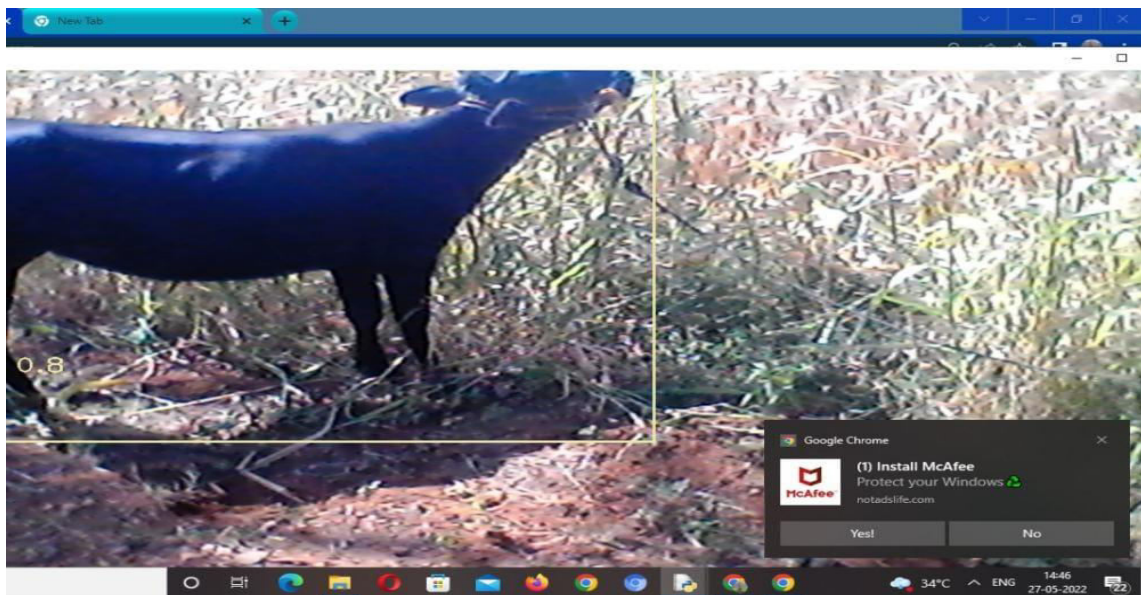
Fig 4.1 Camera Opening
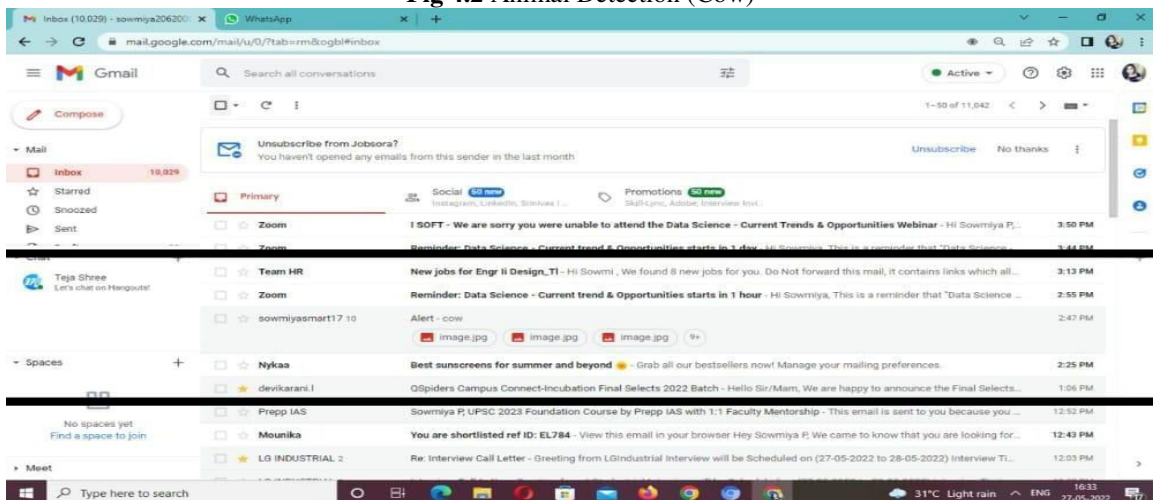

Fig 4.2 Animal Detection (Cow)
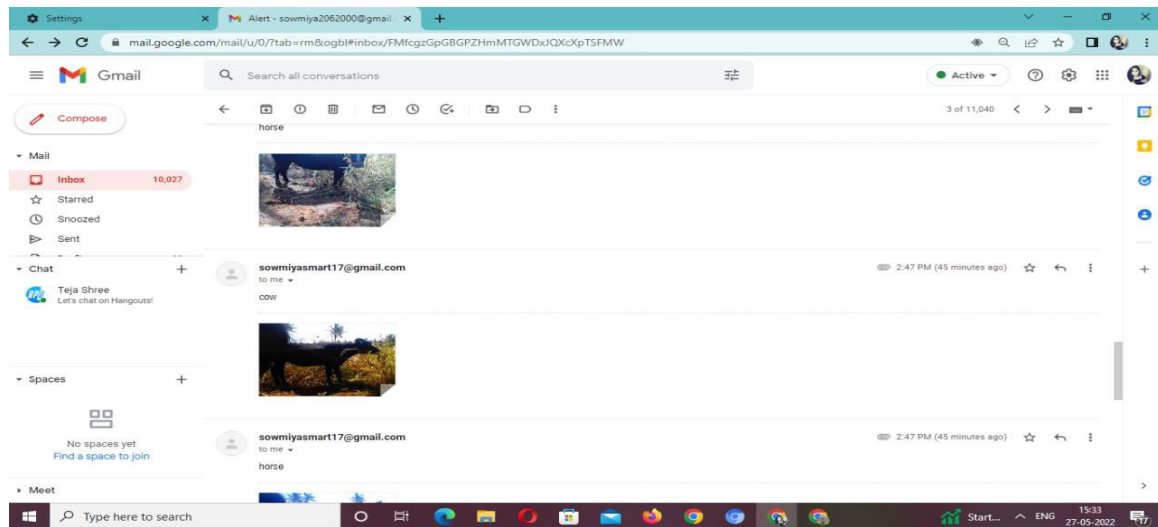

Fig4.3 user notification

Fig 4.4 Alert Message

V. CONCLUSION AND FUTURE WORK

It has been developed by integrating features of all the processor and software used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. The problem of crop canalization by wild animals has become a major social problem in the current time. It requires urgent attention and an effective solution. This approach carries a great social relevance as it aims to address this problem. . The main aim is to prevent the loss of crops and to protect the area from intruders and wild animals which pose a major threat to the agricultural areas. It helps farmers in protecting their orchards and fields and save them from significant financial losses.

In the future, a revised version of the system can be applied to address other human-animal conflicts. It could be modified to scare away other animals such as monkeys, porcupines, insects, and birds. Apart from this, it can be modified to protect villages and homes from wild animals by alarming and scaring away them before they enter the boundaries. Significantly, a modified version of the system can be used to alert drivers about animal crossing areas of major roads and railway crossings. The driver could be alerted about the presence of certain animals and ensure pedestrian safety. It can reduce road accidents caused by animals.

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